Ecological Site Description ID:	F231XY196AK

Ecological Dynamics of the Site:

This boreal ecological site occurs on areas adjacent to the Yukon River that occasionally to very rarely floods. Decreased flood intensity and frequency favors the replacement of deciduous trees with coniferous trees and represents a successional progression from F231XY189AK (i.e. starting with community phase 1.3). As sites progress from community phase 1.3 to 1.1, surface organic matter increases and permafrost develops and rises in the soil profile. For community phase 1.1, soils were classified as haplorthels being composed of organic matter over sand and loamy alluvium.

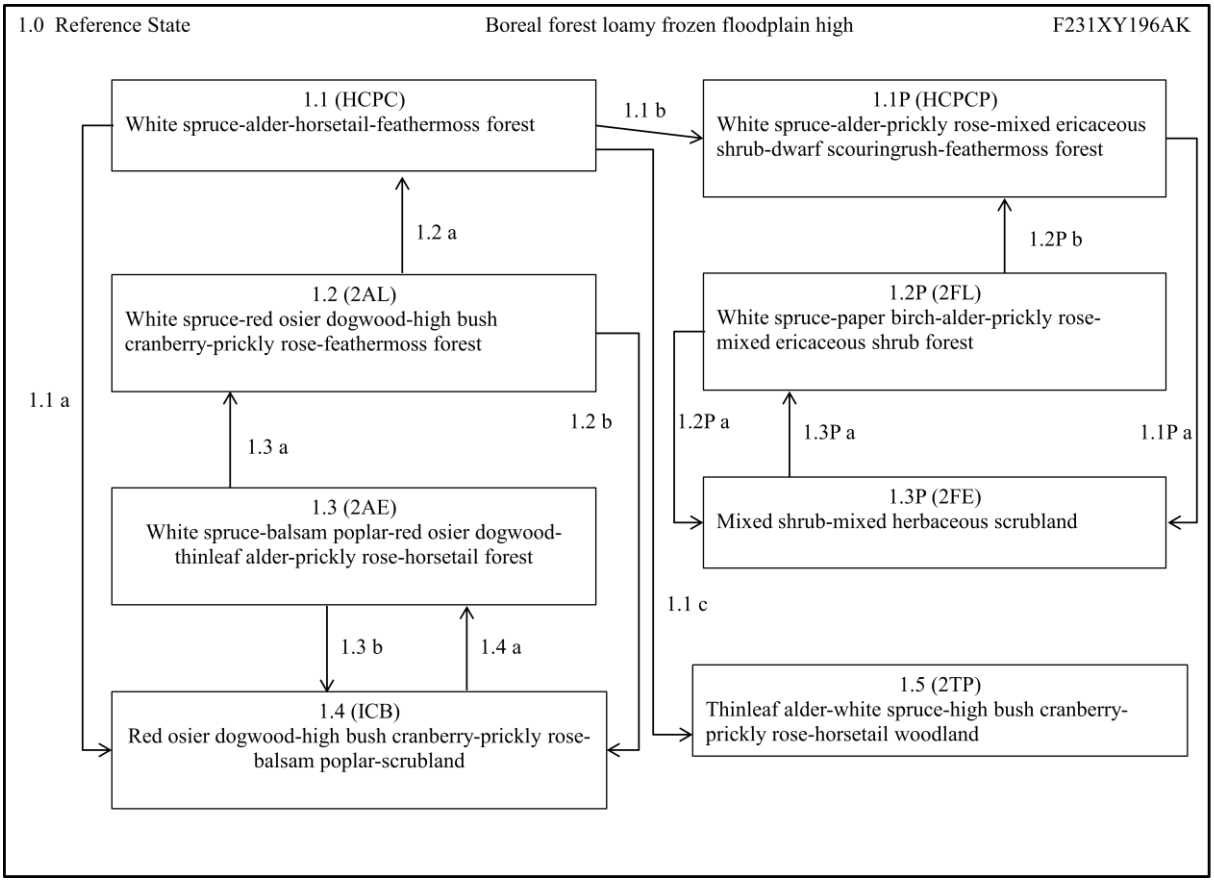
The interactions between ice bulldozing, the development of permafrost, and the flood regime lead to several unique plant community phases for this ecological site.

As a river breaks up in spring, pack ice often breaches the river banks and causes a disturbance we refer to as ice bulldozing. This ice related disturbance was observed to completely shear off the white spruce forest canopy. Unlike deciduous tree and shrub dominant floodplain ecosites (e.g. 189 and 198), white spruce do not regenerate quickly after ice damning/bulldozing events (i.e. perhaps > 100 years). As a result, ice bulldozing results in a unique community phase for this particular ecological site (i.e. community phase 1.4).

As permafrost forms and rises in the soil profile, flood events may result in water being perched for extended periods on the permafrost table. While white spruce can survive flood events, anaerobic conditions associated with ponding can stress and kill mature white spruce stands. It was presumed that areas with large amount of standing dead or wind thrown spruce occur due to long duration ponding events (i.e. community phase 1.5).

As flooding becomes very rare, this ecological site begins to shift towards that of a floodplain terrace (e.g. F231XY169AK). Indicators for this shift were presumed to be cryoturbate material in the soil profile, decreases in white spruce size and density, increases in frequency and density of ericaceous vegetation and black spruce, and increased likelihood of fire disturbance. Sites that display these indicators were described as post-climax for this ecological site (i.e. community phases 1.1P, 1.2P, and 1.3P).

State and Transition Diagram:



State ID Number:	1	State Name:	Reference
State Narrative:	Community phases within the above reference state were grouped on the structure and dominance of white spruce and various understory species. Tall trees are defined as growing >40’ in height, medium trees are defined as growing 15-40’ in height, while stunted and regenerative trees are defined as growing less than 15’ in height. Tall shrubs are defined as growing >10’ in height, medium shrubs are defined as growing 3-10’ in height, low shrubs are defined to grow 8” – 3’ in height, and dwarf shrubs are defined to grow less than 8” in height.		

Photo 1.1	

Community Phase Number:	1.1	Community Phase Name:	White spruce-alder-horsetail-feathermoss forest

Community Phase Narrative:

When compared to phase 1.2, community phase 1.1 has taller and older white spruce. Tree cover primarily occurs in the tall tree stratum and was primarily pure stands of *Picea glauca* (i.e. total mature tree cover was ~50% averaging 140 years of age). Shrub cover was evenly split between the tall, medium, and low shrub stratums (~60% cover). Commonly observed species are *Alnus viridis* ssp. *fruticosa*, *Viburnum edule*, *Rosa acicularis*, *Shepherdia canadensis*, *Linnaea borealis*, and *Arctostaphylos rubra*. Forbs and graminoids formed a dense understory (~80% cover) and commonly observed species include *Equisetum arvense*, *Galium boreale*, *Goodyera repens*, *Bromus inermis* ssp. *pumpellianus*, and *Elymus macrourus*. Moss formed a dense ground mat (~80% cover) and the two most common species were *Hylocomium splendens* and *Rhytidiadelphus triquetrus*. This phase had seven observations.

Community Pathways	
Pathway Number	Pathway Name & Description
1.1a	Intense flooding and/or ice shearing can remove majority of the tree canopy. Species such as balsam poplar, alder, willow, and red osier dogwood quickly reestablish resulting in a community that resembles community phase 1.4.
1.1b	Normal time and growth without flooding. White spruce forest declines in productivity which was believed to coincide with the depth of permafrost.

	Meanwhile, frequency and density of ericaceous plants increases.
1.1c	An event that kills off the majority of the white spruce forest. This was theorized to be prolonged ponding after a flood event.

Photo 1.1p			
Community Phase Number:	1.1p	Community Phase Name:	White spruce-alder-prickly rose-mixed ericaceous shrub-dwarf scouringrush-feathermoss forest

Community Phase Narrative:

When compared to phase 1.1, community phase 1.1p has a less dense white spruce canopy and reduced basal area. In addition, community phase 1.1p has a higher density of ericaceous plants. The tree canopy was primarily composed of *Picea glauca* with *Picea mariana* occasionally occurring as a trace species. Tree cover was split between the tall and medium stratums (~30% cover) and average basal area was 65 (e.g. community phase 1.1 average basal area was 128). Shrub cover was evenly split between the tall, medium, and low shrub stratums (~90% total shrub cover) and commonly observed species include *Alnus sp*., *Rosa acicularis*, *Linnaea borealis*, and *Arctostaphylos rubra*. Commonly observed ericaceous species included *Ledum groenlandicum*, *Vaccinium uliginosum*, and *Chamaedaphne calyculata*. Forbs were abundant (~50% cover) and diverse. The most commonly observed forbs were *Equisetum scirpoides*, *Boschniakia rossica*, and *Mertensia paniculata*. Moss formed a dense ground mat (~80% cover) and the two most common species were *Hylocomium splendens* and *Rhytidiadelphus triquetrus*. This phase had five observations.

Community Pathways

Pathway Number	Pathway Name & Description
1.1Pa	Fire.

Photo 1.2			
Community Phase Number:	1.2	Community Phase Name:	White spruce-red osier dogwood-high bush cranberry-prickly rose-feathermoss forest

Community Phase Narrative:

When compared to phase 1.3, *Picea glauca* is the dominant tree canopy species while *Populus balsamifera* is minor. *Populus balsamifera* will often be observed as standing dead or will be a component of litter on the forest floor. Tree cover primarily occurs in the medium and tall tree stratum (i.e. total mature tree cover was ~60% with *Picea glauca* averaging 77 years of age). Commonly observed understory species include *Alnus viridis* ssp. *fruticosa*, *Rosa acicularis*, *Galium boreale*, *Mertensia paniculata*, *Hylocomium splendens*, and *Rhytidiadelphus triquetrus*. This phase had one observation and had been recently disturbed.

Community Pathways

Pathway Number	Pathway Name & Description
1.2a	Normal time and growth without flooding disturbance that removes the white spruce canopy. White spruce further matures and completely replaces balsam poplar.

1.2b	Intense flooding and/or ice shearing can remove majority of tree canopy. Species such as balsam poplar, alder, willow, and red osier dogwood quickly reestablish resulting in a community that resembles community phase 1.4.

Photo 1.3			
Community Phase Number:	1.3	Community Phase Name:	White spruce-balsam poplar-red osier dogwood-thinleaf alder-prickly rose-horsetail forest
Community Phase Narrative:			
For phase 1.3, *Picea glauca* and *Populus balsamifera* are codominate trees. Tree cover primarily occurs in the medium tree stratum (i.e. total mature tree cover was ~30%). Shrubs primarily occurred in the tall and low stratums (~90% cover) and commonly observed species include *Salix alaxensis*, *Alnus incana* ssp. *tenuifolia*, *Cornus sericea*, and *Rosa acicularis*. Forbs were also abundant (~40% cover) and species commonly observed were *Equisetum arvense*, *Galium boreale*, and *Mertensia paniculata*. This phase had one observation.			

Community Pathways	
Pathway Number	Pathway Name & Description
1.3a	Normal time and growth. White spruce mature outcompeting balsam poplar, which begins to be replaced within the forest canopy.
1.3b	Intense flooding and/or ice shearing can remove majority of tree canopy. Species such as balsam poplar, alder, willow, and red osier dogwood quickly reestablish resulting in a community that resembles community phase 1.4.

Photo 1.4	

Community Phase Number:	1.4	Community Phase Name:	Red osier dogwood-high bush cranberry-prickly rose-balsam poplar-scrubland

Community Phase Narrative:

Phase 1.4 occurs when large blocks of ice shear off the tree canopy leaving an exposed forest understory. When roots remain intact, balsam poplar and several shrub species appear to quickly regenerate after ice bulldozing disturbances. The only tree species observed in these disturbed areas was *Populus balsamifera*, which all occurred in the regeneration tree stratum (~10% cover). Shrubs primarily occurred in the low shrub stratum (total shrub cover ~60%) and commonly observed species include *Viburnum edule*, *Cornus sericea*, and *Rosa acicularis*. Forbs were abundant (~50% cover) and commonly observed species include *Equisetum arvense*, *Galium boreale*, *Mertensia paniculata*, and *Hedysarum alpinum*. This phase had three observations.

Community Pathways	
Pathway Number	Pathway Name & Description
1.4a	Normal time and growth with flooding or ice shearing. It was believed that a white spruce and balsam poplar forest will reestablish on the disturbed site. However, no observations were made on how sites progress after ice shearing.

Photo 1.5	

Community Phase Number:	1.5	Community Phase Name:	Thinleaf alder-white spruce-high bush cranberry-prickly rose-horsetail woodland

Community Phase Narrative:
Phase 1.5 was related to the white spruce forest perishing and opening the forest understory to increased levels of light. This phase is distinctive due to increased densities of tall shrubs and large quantities of wind thrown or standing dead spruce. *Picea glauca* is the dominant tree species and primarily occurs in the tall tree stratum (i.e. total mature tree cover was ~15% averaging 166 years of age). Shrub cover primarily occurs in the tall stratum with *Alnus sp*. forming a dense canopy (~80% cover). Other commonly observed species include *Rosa acicularis*, *Viburnum edule*, *Linnaea borealis*, and *Equisetum sp*. This phase had two observations.

Community Pathways	
Pathway Number	Pathway Name & Description
1.5a	No observations were made on how sites progress after white spruce die-off.

Photo 1.2p	

Community Phase Number:	1.2p	Community Phase Name:	White spruce-paper birch-alder-prickly rose-mixed ericaceous shrub forest

Community Phase Narrative:

When compared to phase 1.1p, community phase 1.2p has younger *Picea glauca* which codominates with *Betula neoalaskana*. Tree cover was split between the tall and medium tree stratums (~30% cover) and average *Picea glauca* tree age was 76 (i.e. white spruce averaged 156 years of age for community 1.1p). Shrubs were the dominant form of vegetation (~100% cover) the most common species being *Alnus viridis* ssp. *fruticosa*, *Vaccinium uliginosum*, *Ledum groenlandicum*, *Rosa acicularis*, and *Chamaedaphne calyculata*. Graminoids and forbs were abundant (~75% combined cover) and commonly observed species include *Calamagrostis canadensis*, *Equisetum scirpoides*, *Boschniakia rossica*, and *Mertensia paniculata*. This phase had two observations.

Community Pathways

Pathway Number	Pathway Name & Description
1.2Pa	Fire.
1.2Pb	Normal time and growth without fire. Paper birch dies off and is replaced by white spruce.

Photo 1.3p	n/a		
Community Phase Number:	1.3p	Community Phase Name:	Mixed shrub-mixed herbaceous scrubland
Community Phase Narrative:			
This phase had no observations. This community is conceptual and would be considered an early-fire sere associated with a post-climax high-floodplain forest.			

Community Pathways	
Pathway Number	Pathway Name & Description
1.3Pa	Normal time and growth without fire.